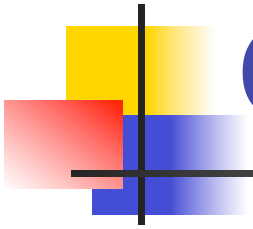
Manipulatable Intracoronary Wire

Team Members: Allison McArton
Angwei Law
Grant Smith
Padraic Casserly

Client: Dr. Vik Chhokar, Dept. of Medicine

Advisor: Prof. John Webster, Dept. of Biomedical Engineering

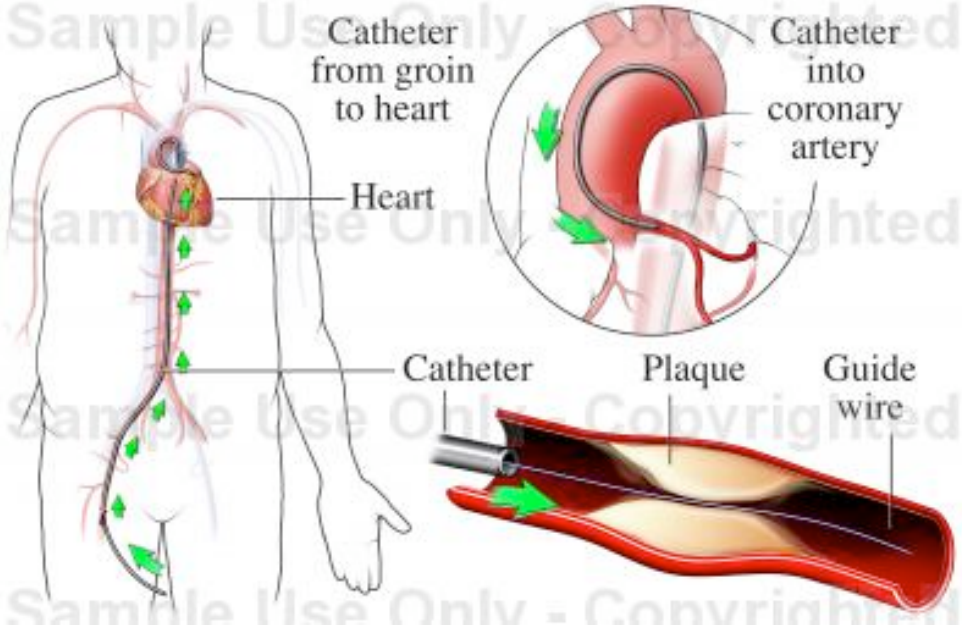


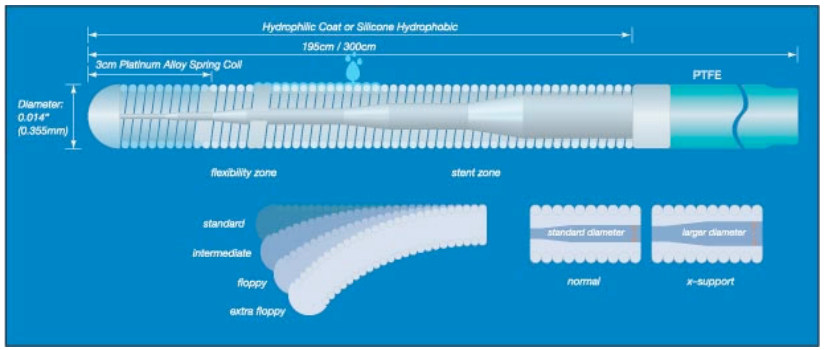
Outline

- Guidewires and You
- Guidewire Design
- What We Want…
- Design Requirements
- Solution Ideas
- Evaluation of Ideas
- Future Work

Guidewires and You

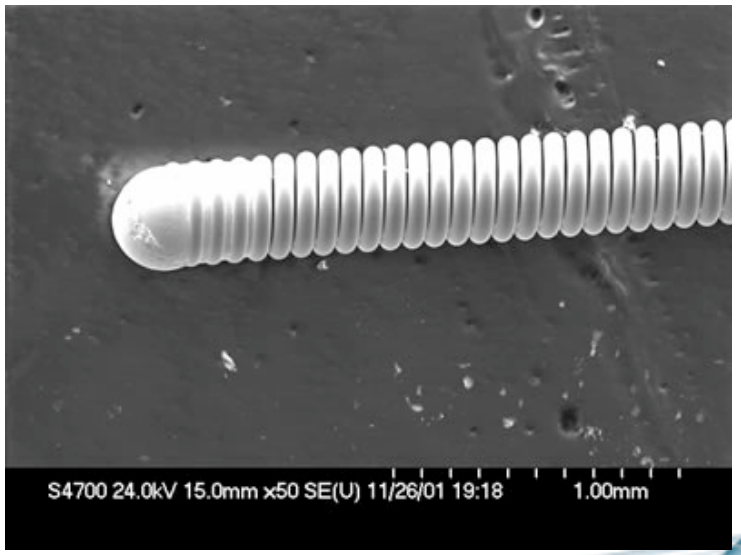
- Inserted distally in the groin or arm
- Maneuvered to position in coronary arteries
- Inserted past blocked region
- Delivery mechanism for stents
- Typically 350 μm in diameter and 150-350 cm long

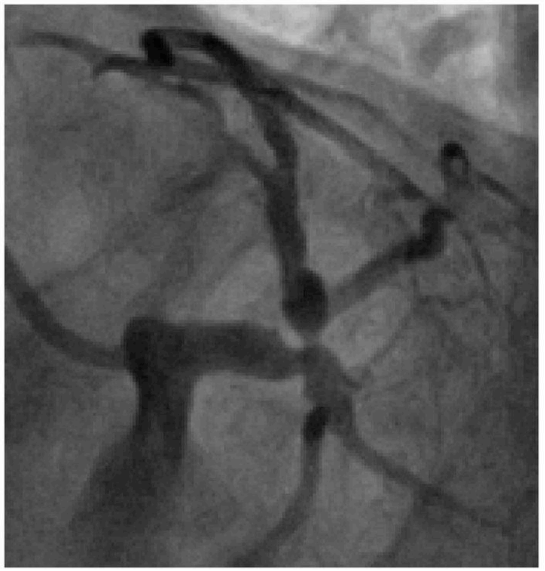




Guidewire Design

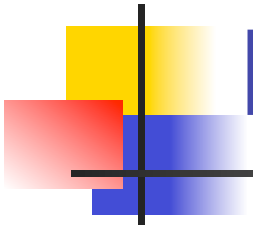
- Stainless steel or Nitinol core
- Platinum outer coil wire at distal end
- Soft polymer coating and tip
- Problems with previous steerable designs





What We Want…

- A novel coronary guidewire is to be developed such that torqueability along the wire's entire length is maintained and the wire's tip conformation can be changed in vivo via external operation

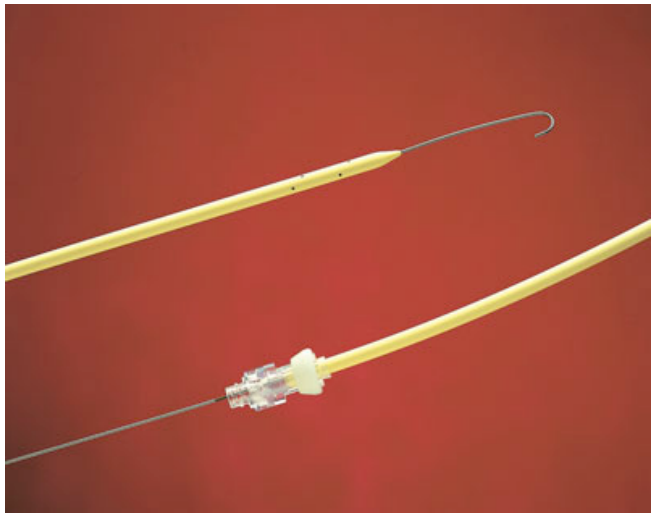


PDS

- Design Requirements
  - Biocompatible/ percutaneous
  - Steerable and torqueable
  - Maximum diameter of 350 μm
- Product Characteristics
  - Durable in tortuous environments
  - Easily manipulated
- Miscellaneous

Design Idea #1: Sheath

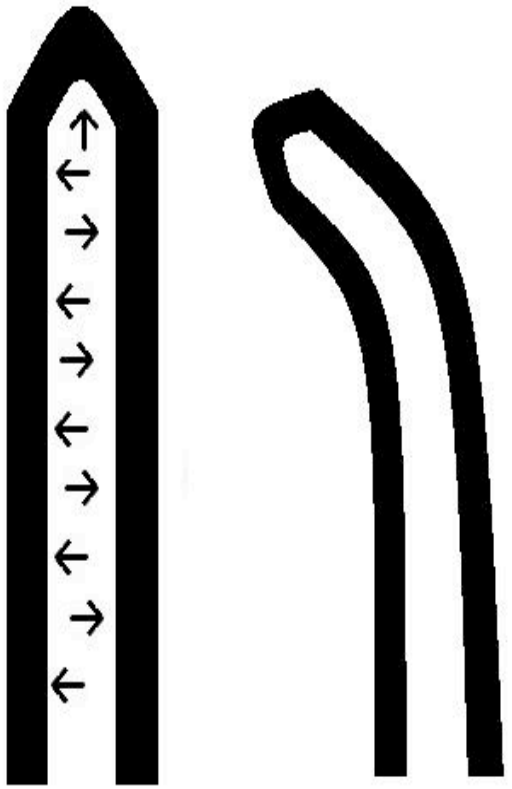
- Wire set as J-shape
- Wire straightens when sheath pushed over tip
- Could also be implemented vice versa
- Already used on a larger scale



https://lifeassistshop.life-assist.com/CatalogImages/FullSize/01_at2780a.jpg

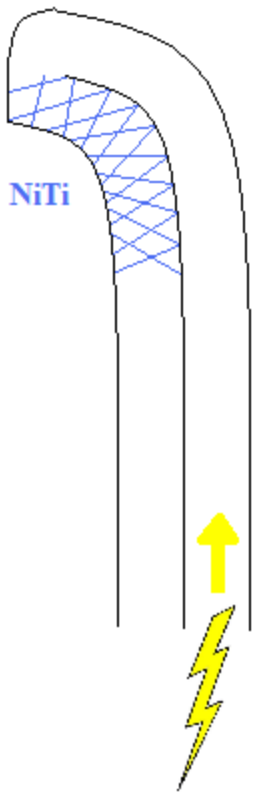
Design Idea #2: Pneumatic

- Wire pre-stressed in a curved state
- Hollow core leading to distal cavity
- Pressurization of internal air straightens wire



Design Idea #3: Memory Metal

- Nickel Titanium/Nitinol
- Shortens when heated to transformation temp
- Crystal structure
- Can be heated with electricity

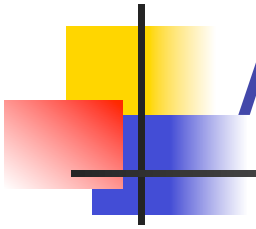


Design Matrix

CRITERIA	WEIGHT	SHEATH	PNEUMATIC	MEMORY METAL
Ease of Manufacturing	35	30	20	25
Performance	35	25	30	30
Ease of Use	20	16	20	20
Monetary Cost	10	9	8	7
TOTAL	**100**	**80**	**78**	**82**

Future Work

- Determine most suitable method to bind Nitinol wire to stainless steel wire
- Obtain Nitinol wire with desired phase transformation temperature
- Construct a scaled-up prototype
- Carry out testing



Acknowledgements

- Dr. Vik Chhokar
- Prof. John Webster
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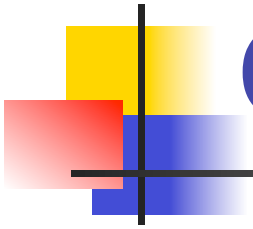

Questions?